

1. GENERAL INTRODUCTION

1.1 Objective

The Arctic region has gained importance in recent years due to the discovery of large oil reserves and the potential of other vital resources in the area. Any confrontation with other nations in the Arctic is likely to take place under adverse conditions in a hostile and not well-known environment. The need for an updated version of the Arctic Forecast Guide is readily apparent.

The original objective was to revise the Arctic Forecast Guide, written in 1962. Considering the amount of research carried out in the polar regions since then, however, the decision was made to conduct a major rewrite. The objective, therefore, became one of producing a useful, up-to-date handbook that would provide a reference for the operational forecaster and still contain background material that could be studied to enhance further understanding of Arctic phenomena. Several good references are available on various specific phenomena of the Arctic (aircraft icing, icebergs, etc.), and to include lengthy sections on all phenomena in this guide is unrealistic. A good statistical reference for the Alaska region is the *Climatic Atlas* produced by the National Climatic Center (Asheville, North Carolina) and the Arctic Environmental Information and Data Center (University of Alaska, Fairbanks, Alaska). The reader is directed to the reference section for further reading if desired.

1.2 Approach

Using the 1962 version as a basis, certain sections of that publication were targeted for expansion while new sections were to be added. Because of the usefulness of satellite imagery in weather forecasting today, an entire section is dedicated to weather satellite case studies. A good climatological database is difficult to find and maintain in data sparse areas, the Arctic being a prime example. Due to investment in an Arctic Buoy program by the United States, Canada, and other international partners over the past several years, however, it has been possible to create an improved climatology of mean monthly surface pressures and temperatures over the icecap. These data are included in the handbook. Also, the decision was made to include sections on refractivity, polar lows, and numerical models, all of which are new to the 1990 version.

1.3 Organization and Contents

To provide the reader with an understanding of the physical environment of the Arctic, a chapter on physical characteristics is presented early. This chapter includes submarine topography, major landforms and islands, Arctic ice and currents and tides. Several locator maps are included to help the reader's geographic orientation. The chapter on Arctic climatology includes subsections on major causal factors and individual elements. The section on polar lows presents general polar low patterns, plus five case studies supported by weather charts and satellite pictures. The chapter on refractivity has a subsection describing the Integrated Refractive Effects Prediction System (IREPS) and IREPS products. The section on numerical models touches on the basics of atmospheric models and discusses the pitfalls of relying solely on their outputs. The reference section contains five dozen references; only three of the documents were published before 1962, and half were published since 1985. For easy referral, a glossary of ice terms and monthly maps of air temperature and surface pressure are included in the appendices section. For a complete review of what is included in this handbook, the reader is referred to the table of contents.

Weather charts included in the text are operational charts produced by the Fleet Numerical Oceanography Center. Station plots may be difficult to read; however, the intent, in general, is to show the large-scale analysis. When necessary, amplification of smaller scale phenomena is included in the text.

Draft copies of this handbook were given to several reviewers. Where feasible, their comments and suggestions have been incorporated into the final version. The reviewers' assistance in completing this handbook is greatly appreciated.